

VI.3.3B-DEFINE-AREA PROGRAM PPINIT COMMAND DEFINE AREA (FMAP, MAP, MAPE, MAPX AND MAT)

Purpose

Command DEFINE AREA is used to define or redefine parameters for the following area types:

- o Future Mean Areal Precipitation (FMAP)
- o Mean Areal Precipitation (MAP)
- o Mean Areal Potential Evaporation (MAPE)
- o NEXRAD Mean Areal Precipitation (MAPX)
- o Mean Areal Temperature (MAT)

Before an area can be defined any stations and/or basin boundaries referenced must already have been defined and the NETWORK command must have been run on all stations referenced.

Before a regular MAP area can be defined the Future MAP area that it references must have been defined.

Input Data

The general format of the DEFINE command is described on page VI.3.3B-DEFINE. The input described here immediately follows the DEFINE command.

If the 'PLOT(YES)' option command has been specified on either the DEFINE or the SETOPT command, a map of the basin boundary parameters will be printed for MAP and MAT areas that use basin boundaries.

Card	Field	Required/ Optional 1/	Format	Description
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The following input is used to define Future MAP area parameters. 2/ 4/

1	1	R	A	'FMAP'
	2	R	A8	Identifier
	3	R #	A20	Description
	4	R #	(R,R)	Centroid of area (latitude and longitude in decimal degrees)

The following input is used to define MAP area parameters. 2/ 4/

1	1	R	A	'MAP'
	2	R	A8	Identifier
	3	R #	A20	Description

Card	Field	Required/ Optional 1/	Format	Description
	4	R #	A8 or (R,R)	Basin boundary identifier or centroid of area (latitude and longitude in decimal degrees) <u>5/</u>
	5	R #	A or A(R) or A({A8,R})	Type of timing weights: <u>6/</u> 'D2' = 1/d**2 (default) 'DP(power)' = 1/d**power <u>7/</u> 'PRE{id,wt})' = predetermined
	6-1	R #	A or A(R) or A({A8,R}) or A({A8,R})A	Type of station weights: <u>8/</u> <u>17/</u> 'THIE' = Thiessen (default if basin boundary used) 'GRID' = grid point 'DP(power)' = 1/d**power (default if basin boundary not used) <u>7/</u> 'PRE({id,wt})' = predetermined <u>9/</u> 'PRE({id,wt})WNTR' = predetermined weights for winter season <u>9/</u>
	6-2	R #	A({A8,R})A	Predetermined weights for summer season (field is required only if seasonal weights used) 'PRE({id,wt})SUMR' <u>9/</u>
	7	R #	A or A({R,R})	MDR usage option: <u>10/</u> 'NMDR' = do not use MDR (default if no basin boundary is specified or PRE is specified for type of station weights) 'MDR' or 'MDR({lat,lon})' = use MDR (Default if basin boundary is specified and THIE, GRID or DP is specified for type of station weights) - 4 latitude and longitude pairs are used to define the subset to be used: pair1=upper left corner pair2=upper right corner pair3=lower right corner pair4=lower left corner
	8	R #	A8	Identifier of Future MAP area assigned to this area

Card	Field	Required/ Optional	1/ Format	Description
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11/

The following input can be used to define MAPE area parameters 2/
3/ 14/

1	1	R	A or A(A)	'MAPE' or 'MAPE(units)'
	2	R	A8	Identifier
	3	R #	A20	Description
	4	R #	(R,R)	Centroid area (latitude and longitude in decimal degrees)
	5	R #	A({A8,R}) or A(R)	Type of station weights: <u>15/</u> 'PRE({id,wt})' = predetermined 'DP(power)' = 1/d**power (default) <u>7/</u>
	6	R #	(12*R)	Mean PE for the 16th of each month in units of IN or MM (enclosed in parentheses) <u>16/</u>

The following input is used to define MAPX area parameters.

1	1	R	A	'MAPX' <u>18/</u>
	2	R	A8	Identifier
	3	R #	A20	Description
	4	R #	I	Number of basins (NBASIN) - not needed if only one basin boundary identifier specified
	5	R #	A8	Basin boundary identifiers <u>19/ 20/</u>
	5+NBASIN	R #	A8	Identifier of Future MAP time series assigned to this area

The following input is used to define MAT area parameters. 2/ 12/

1	1	R	A	'MAT'
	2	R	A8	Identifier
	3	R #	A20	Description

<u>Card</u>	<u>Field</u>	<u>Required/ Optional</u>	<u>1/ Format</u>	<u>Description</u>
	4	R #	A8 or (R,R)	Basin boundary identifier or centroid of area (latitude and longitude in decimal degrees) <u>5/</u>
	5	R #	A or A(R) or A({A8,R})	Type of station weights: <u>13/</u> <u>17/</u> 'GRID' = grid point (default if basin boundary used) 'DP(power)' = 1/d**power (default if basin boundary not used) <u>7/</u> 'PRE{id,wt})' = predetermined

Notes:

- 1/ A '#' indicates that the parameter value can be changed when redefining an area.
- 2/ If an area type is being redefined, all the required parameters for the type must be entered. The optional parameters need to be entered only if they are being changed. Only those parameters with a '#' next to the required/optional indicator can be changed.
- 3/ The units in which the data is being input can be specified in this field. If the parameters are being input in English units, the unit code ENGL can be entered. If the parameters are being input in metric units, the unit code METR must be entered. The default units code is ENGL.
- 4/ The MAP and FMAP Preprocessors produce 6-hour mean areal precipitation time series which are written to the Processed Data Base.
- 5/ If a basin boundary identifier is specified, the centroid of the area will be computed from the basin boundary parameters. If a basin boundary identifier is not specified, the centroid of the area must be input. If the centroid is input it must be enclosed in parentheses with the latitude first and longitude second. The centroid is input as decimal degrees.

A basin boundary can be used by only one MAP, one MAPX and one MAT area.

- 6/ The type of timing weights specifies whether 1/d**2, 1/d**power or predetermined weights are to be used to time distribute the 24 hour precipitation amounts. If 'DP' is specified, the power in 1/d**power can be input enclosed in parentheses; if the power is not input, it is obtained from the user specified default (see

DEFINE USER command). If 'PRE' is specified, the identifiers (8 character) and predetermined timing weights of the stations to be used must be input. The list of identifiers and weights must be enclosed in parentheses. The maximum number of stations with predetermined timing weights is 10. Predetermined weights can be any value greater than zero.

The default type of timing weights to be used is $1/d^{**2}$.

- 7/ The $1/d^{**power}$ method weights stations by $1/d^{**power}$ about the centroid of the area. This method uses all stations regardless of direction from the centroid whereas $1/d^{**2}$ uses only one station per quadrant. All stations with a weight greater than or equal to the user specified value (see DEFINE USER command) will be used. The maximum number is the same as for the parameter being defined (10 for timing weights, no maximum for station weights).

The power in $1/d^{**power}$ can be input enclosed in parenthesis; if not, it is obtained from the user specified default (see DEFINE USER command).

- 8/ The type of station weights specifies whether grid point, Thiessen, $1/d^{**power}$ or predetermined weights are to be used to compute the MAP values. If 'DP' is specified, the power in $1/d^{**power}$ can be input enclosed in parentheses; if the power is not input, it is obtained from the user specified default (see DEFINE USER command). If 'PRE' is specified, the identifiers and predetermined weights of the stations to be used must be input. The list of identifiers and weights must be enclosed in parentheses. There is no maximum number of predetermined stations allowed.

If 'GRID' or 'THIE' is specified, a basin boundary identifier must be specified.

The default is 'THIE' if a basin boundary identifier has been specified; otherwise $1/d^{**power}$ is the default. Predetermined weights normally but do not have to sum to 1.0. If the weights sum to other than 1.0 it indicates that the precipitation for the area associated with one or more gages is greater than or less than the precipitation at the gage. A warning is printed if the weights do not sum to 1.0.

- 9/ Two different sets of predetermined weights can be specified to weight stations differently in the summer or winter seasons. If the characters 'SUMR' follow the right parenthesis, the weights will be applied in the summer season. If the characters 'WNTR' follows the right parenthesis, the weights will be applied in the winter season. If no characters immediately follow the right parenthesis, the weights will be applied during the entire year. If seasonal weights are used, both winter and summer season weights must be defined, the winter weights must specified first, and the identifiers for the summer weights must be input in the same order as the identifiers for the winter weights.

The beginning of the summer and winter season can be specified using the DEFINE USER command.

10/ MDR data can be used for an MAP area to compute the MAP amount and/or time distribute the daily MAP into 6-hour values. If 'MDR' is specified and no basin boundary identifier has been input, four latitude and longitude pairs are input and enclosed in parenthesis to define the area boundary for MDR processing. 'NMDR' indicates MDR data can never be used to estimate or distribute MAP values. 'MDR' indicates MDR data can be used; the data will be used only if the requested by the user when the MAP Preprocessor is run. A description of the MDR grid and box number notation can be found in section VI.3.3C.

If no basin boundary identifier is specified or PRE is specified as the type of station weights, the default is 'NMDR'.

If a basin boundary identifier is specified and THIE, GRID or DP is specified as the type of station weights, the default is 'MDR'.

11/ The same Future MAP area can be assigned to more than one regular MAP area.

12/ The MAT Preprocessor produces a 6 hour mean areal temperature time series and writes it to the Processed Data Base. The time series can include data in the regular and/or future period.

13/ The type of station weights specifies whether grid point, 1/d**power or predetermined weights are to be used to compute the MAT values. If 'DP' is specified, the power in 1/d**power can be input enclosed in parenthesis; if not input, it is obtained from the user specified default (see DEFINE USER command). If 'PRE' is specified, the identifiers and weights of the stations to be used must be input. The list of identifiers must be enclosed in parenthesis. There is no maximum number of predetermined station weights. The default type of station weights to be used is 'GRID' if basin boundaries are used and 1/d**power if basin boundaries are not used.

14/ The MAPE Preprocessor produces a 24 hour mean areal potential evaporation time series and writes it to the Processed Data Base. The time series can include data in the regular and/or future period.

15/ The type of station weights specifies whether predetermined or 1/d**power weights are to be used to compute MAPE values. If 'PRE' is specified, the identifiers and weights to be used must be input. The list of identifiers and weights must be enclosed in parenthesis. There is no maximum number of predetermined station weights. If 'DP' is specified, the power in 1/d**power can be input enclosed in parenthesis; if not, it is obtained from the user specified default (see DEFINE USER command). The default is 1/d**power.

16/ The mean PE for the 16th of each month is used to estimate

missing days and future values. There must be one value for each month starting with January and the values must be enclosed in parenthesis.

If 'MAPE(ENGL)' has been specified, the units of the mean PE must be inches (IN). If 'MAPE(METR)' has been specified, the units of the mean PE must be millimeters (MM).

- 17/ If 'GRID' or 'THIE' is specified for an MAP area or if 'GRID' is specified for an MAT area, the number of estimator stations is checked as follows:
- o The number of potential stations with weights (NWT) is determined using the designated weighting technique.
 - o The minimum weight of stations to be kept when doing station weighting is obtained from the User General Parameters (STMIN).
 - o If NWT is greater than $.5/STMIN$, then STMIN is set to $.5/NWT$ for this area. This adjustment is needed for large areas with many potential estimators.
 - o Only potential estimators with a weight greater than or equal to STMIN are used. The maximum number of estimators is 99 for MAP and 50 for MAT.
- 18/ The time interval of the MAPX time series will always be 1 hour.
- 19/ A given basin boundary can be used by only one MAPX area.
- 20/ The basin boundaries referenced cannot contain HRAP grid locations that fall outside the RFC HRAP subset specified by DEFINE USER,

Sample Input

To define a new MAP area with the following parameters:

```
Identifier = POTMCLWR
Description = LOWER POTOMAC
Basin boundary identifier = POTMCLWR
Type of timing weights = D2 (1/d**2)
Type of station weights = DP (1/d**power)
Exponent in 1/d**power = 1.5
MDR Usage option = NMDR (do not use MDR)
Identifier of Future MAP area = POTFMAP
```

the following input would be used:

```
@DEFINE AREA NEW
MAP POTMCLWR 'LOWER POTOMAC' POTMCLWR
D2 DP(1.5) NMDR POTFMAP
```

To define a new MAT area with the following parameters:

```
Identifier = POTMCLWR
Description = 'LOWER POTOMAC'
Basin boundary identifier = POTMCLWR
Type of station weights = GRID
```

the following input would be used:

```
@DEFINE AREA NEW
MAT POTMCLWR 'LOWER POTOMAC' POTMCLWR GRID
```

To define a new MAPE area with the following parameters:

```
Identifier = POTOMAC
Description = POTOMAC RIVER

Centroid = 38.5 degrees latitude
           77.05 degrees longitude
Type of station weights = predetermined
Mean PE for 16th of each month (in MM) = 1.0 1.5 2.0 2.5 3.0 3.5
                                           3.5 3.0 2.5 2.0 1.5 1.0
```

the following input would be used:

```
@DEFINE AREA NEW
MAPE(METR) POTOMAC 'POTOMAC RIVER' (38.5,77.05)
PRE(DCA .5 DULLES .5)
(1. 1.5 2. 2.5 3. 3.5 3.5 3. 2.5 2. 1.5 1.)
```

The following example would redefine an MAP and an MAT area:

```
@DEFINE AREA OLD
$ REDEFINE MAP AREA PARAMETERS - BASIN ID NOT SPECIFIED
MAP POTMCUPR 'UPPER POTOMAC' (39.5,78.) ,,
PRE(DCA .5 DULLES .25 LEESBURG .25)WNTR
PRE(DCA .4 DULLES .3 LEESBURG .3)SUMR
MDR(38.75 78.5 38.75 76.5 38. 76.5 38. 78.5)
POTFMAP
$ REDEFINE MAT AREA PARAMETERS
MAT POTMCLWR 'LOWER POTOMAC' POTMCLWR DP
```